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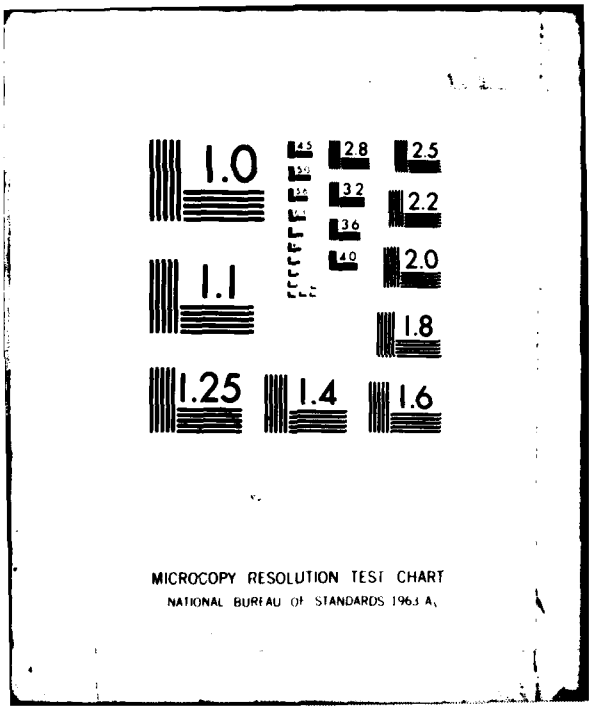
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ATTN: Director of Joint Forces and Strategy
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STUDY REPORT
CAA-SR-81-17

STUDY FOR IMPROVING THE DEFINITION OF THE ARMY OBJECTIVE FORCE METHODOLOGY, PHASE II (IDOFOR II)

VOLUME I - EXECUTIVE SUMMARY

October 1981

Prepared by

Joint Forces and Strategy Directorate

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CAA-SR-81-17

DEPARTMENT OF THE ARMY
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REPLY TO
ATTENTION OF

CSCA-JFC

22 October 1981

SUBJECT: IDOFOR II Final Report

Deputy Chief of Staff for Operations and Plans
Department of the Army
Washington, DC 20310

1. Reference is made to DAMO-SSW letter, 16 October 1980, subject: Army Mid Range Planning, which directed the US Army Concepts Analysis Agency (USACAA) to conduct phase two of the Study to Improve the Definition of the Army Objective Force Methodology (IDOFOR II).

2. This report fulfills the requirements established by the reference and provides analytical methods for the design, evaluation, and acquisition of deployable Army forces. The results presented include analytically based force designs structured for the objective Army timeframe some 10-12 years in the future.

3. The analysis addresses top-down force structuring of alternative Army objective forces from a theater-level perspective. Each alternative is analytically derived and quantitatively evaluated. IDOFOR II is designed to complement the Force Design efforts of the US Army Training and Doctrine Command (TRADOC). The results will provide the Army Staff with an improved methodology to support the exercise of its planning responsibilities within the PPBS.

EDWARD B. ATKESON
Major General, USA
Commanding

CONTENTS

VOLUME I - EXECUTIVE SUMMARY (UNCLASSIFIED)

FIGURES

TABLES

CAA-SR-81-17

STUDY FOR IMPROVING THE DEFINITION OF THE ARMY OBJECTIVE FORCE METHODOLOGY, PHASE II (IDOFOR II)

VOLUME I - EXECUTIVE SUMMARY

1. BACKGROUND

a. The IDOFOR II Study is a continuing methodology improvement which evolves from the CONAF I to V series of studies, the TRANSFORM Study, and the IDOFOR I Study published by the US Army Concepts Analysis Agency (CAA) in July 1980.

b. The methodology provides a means for structuring the Army Objective Force described in the Extended Planning Annex (EPA) to the Army Program Objective Memorandum (POM) FY 83-87. The objective force is defined as that force resulting from the use of ". . . available resources [in order to] permit planning significant improvements to the programed force to move towards achieving the Planning Forces."

2. PROBLEM. The Army requires improved methodologies to support the exercise of its planning responsibilities within the PPBS. Current methods lack the scope and richness of choice necessary to define comprehensively the kind of Army which is both required and affordable in the mid-range period. While elements of the required methodologies have been available--resource projection, conceptual force design, combat developments--they have not yet been focused collectively on the problem of defining an objective Army force. This must be done in such a way that programers and planners can have a clear indication of Army priorities to guide the development of investment strategies, programing goals, and program priorities.

3. PURPOSE. The purpose of the IDOFOR II Study is to continue development of an improved methodology for defining the Objective Army Force for the far mid-range or, in other words, "to find a way to find the Army Force." Specifically the methodology must address three questions. What size should the deployable Army be? What should the composition be in terms of organizations such as Division 86, and what should their status Active or Reserve be? Lastly, how may the force be transitioned from the current or programed Army to the far mid-range objective Army?

4. OBJECTIVES. To develop an interactive methodology involving CAA, the Army Staff, and TRADOC that expands IDOFOR I methodology to include warfighting analysis of a non-NATO scenario and to provide alternative force designs for selection of an Army objective force.

a. Fully develop IDOFOR I risk assessment methodology applicable to a NATO and non-NATO scenario.

b. Fully develop IDOFOR I acquisition strategy for a specified design force to be selected from the alternative force designs considered.

5. SCOPE

a. This study continues the development of the IDOFOR I methodology, applies the resultant products to the deployable Army (Active and Reserve Components) for conventional combat in non-NATO scenarios, and develops the connectivity between IDOFOR I (NATO) and IDOFOR II (non-NATO) methodologies.

b. The methodology is structured to incorporate follow-on study efforts of this series to:

(1) Expand the worldwide methodology to include an integrated battlefield option based on the development of an integrated battlefield scenario by reference to the Theater Integrated Warfare Scenario Study (TIWSS) (in progress at CAA).

(2) Expand the worldwide methodology to encompass the total Army and assist in developing guidance for the sustaining base and all force related programs in the POM.

c. This methodology exploits and improves existing techniques. It will incorporate current aspects of the JSPD Analyses and replace that effort in FY 1982. The point of departure is the revitalized long-range planning effort which will provide a necessary backdrop and source of ideas for this effort.

d. The product requirements will be cyclical but will not necessarily be required on a fixed annual recurring schedule. This product and subsequent applications of the methodology will be documented and will provide an analytic basis for staff analysis. Analytical products produced by the methodology are expected to have a shelf life of 2 years or more.

e. The improved methodology has embedded in it the capability to ascribe funding and other resources to each future objective force design considered. Cost estimates are attributable to each fiscal year in terms of recurring and nonrecurring costs. The resource model is capable of relatively rapid use for gross force comparisons.

f. The improved methodology will provide, as an adjunct to its primary aim, for specific analysis to be done in response to special tasking requirements prepared by the Army Staff in coordination with CAA. The purpose of this capability is to respond to emerging real-time force issues facing the Army by exploiting the force design methodology to obtain quick reaction products.

g. Development of major forces' input to the Joint Strategic Planning System (JSPS) in the form of force requirements, a planning force

for the JSPD and major forces' input to the PPBS in the form of Army objective and program forces, together with a programing strategy for the Army POM, will be accomplished independently by the Army Staff based on products of this methodology.

6. TIMEFRAME. In order to allow sufficient time beyond the POM years for force structure changes to be implemented, this methodology focuses 10-12 years into the future. The specific design year for this phase of the study is 1992. The methodology has the capability of focusing on any specified intervening year when required to satisfy needs for special force analyses. Projection beyond 12 years into the future becomes more nebulous because of limited available quantifiable information.

7. ASSUMPTIONS. Overall study assumptions given to the study group are shown below (specific assumptions keyed to particular portions of the methodology are discussed in the appropriate section):

a. The current organization and functions of the Army, JCS, and OSD will remain basically unchanged.

b. Army force planning will remain focused on NATO but will require an increased capability to respond to non-NATO contingencies.

c. The sequential characteristics of the PPBS will remain essentially unchanged.

8. METHODOLOGY OVERVIEW

a. In the overall IDOFOR II methodology (see Figure 1), the current combat force structure has been modernized for 1992 with new or product-improved weapons. The force was then divided to support a Southwest Asia scenario; the warfighting simulation used the ATLAS (A Tactical, Logistic, and Air Simulation) Model. The remainder of the force opposed a Warsaw Pact construct in Europe, the warfighting simulation used the Concepts Evaluation Model (CEM). The resultant combat workloads and effectiveness results were used by the Force Analysis Simulation of Theater Administrative and Logistics Support (FASTALS) Model to "round out" the combat forces with a fully structured and supported combat service support troop list. Then, sequentially, the weapons systems of tanks, artillery, lightly armored tracked vehicles (LATV, composed of infantry fighting vehicles (IFV), cavalry fighting vehicles (CFV), improved TOW vehicles (ITV), and armored personnel carriers (APC)), helicopters, and infantry were withdrawn from the combat structure. Each of the diminished forces was again "rounded out" with FASTALS. The difference in terms of recurring and nonrecurring dollars, people required, and lift requirement in short tons was ascribed against that particular weapon system "slice." These system slices were subdivided into individual weapon slices. Table 1, for example, compares slice personnel requirements for both theaters and for different time periods in Europe.

IDOFOR I METHODOLOGY

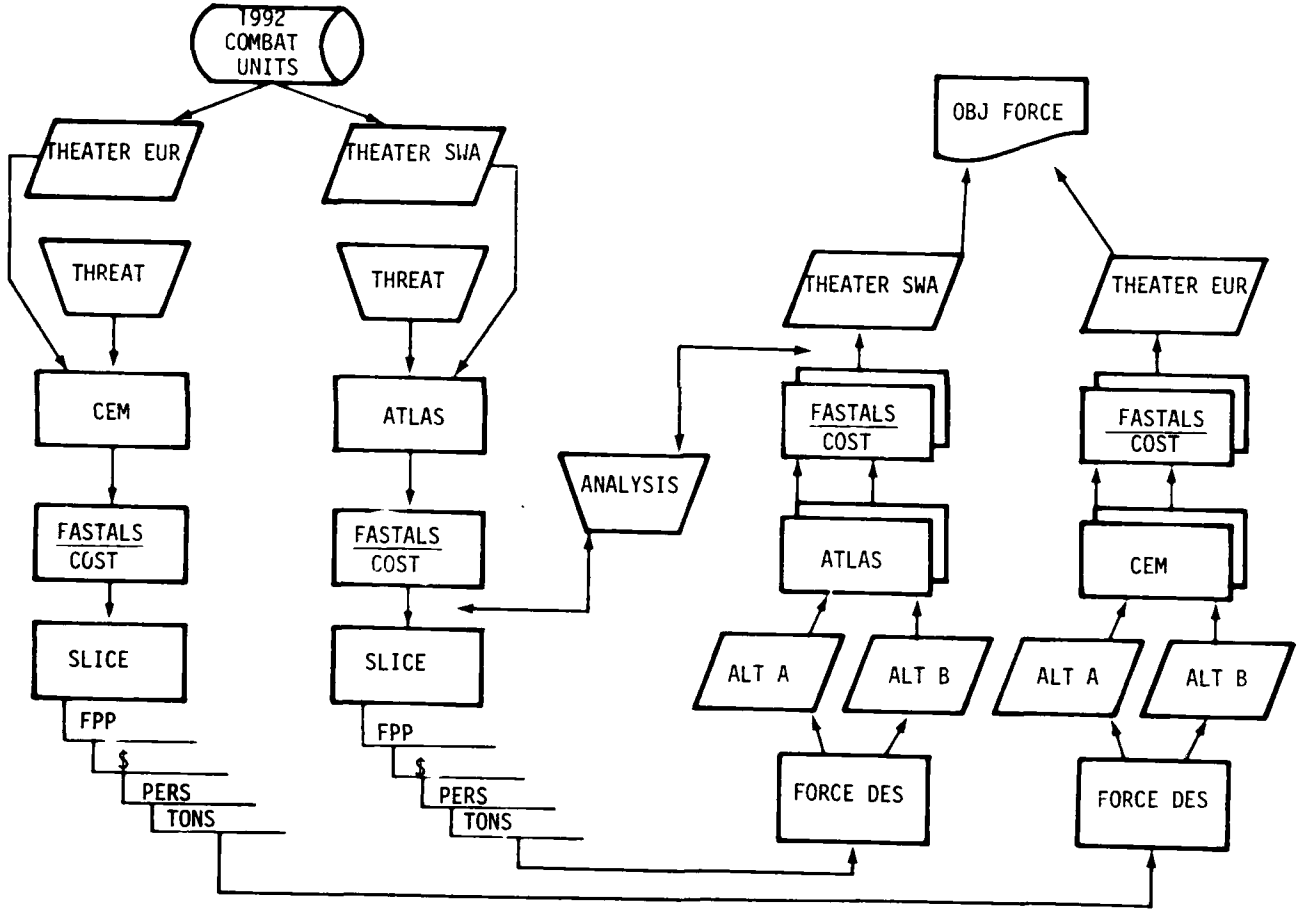


Figure 1. IDOFOR II Force Design and Evaluation Methodology

Table 1. IDOFOR II Personnel per Weapon System Slice

Weapon system slice	Europe			SWA	IDOFOR I
	M-day	D+20	D+90	D+80	D+90
Tank	9.9	15.5	19.6	18.0	19.6
IFV/CFV/ITV	5.2	7.9	10.1	8.9	10.7
APC	3.2	5.9	8.1	6.9	6.5
FA	49.5	55.5	61.3	87.5	57.1
Helicopter					
Attack	13.2	16.3	16.9	18.1	18.5
Utility	11.5	14.6	15.2	16.3	17.7
Cargo	14.9	18.0	18.5	19.7	17.3
Sct/Obsn	7.9	11.0	11.6	12.7	8.9
Infantry	1.5	1.9	2.2	2.1	2.3
DRAGON	3.1	3.8	4.3	4.2	4.6
Ground TOW	7.7	11.8	11.8	11.8	11.8
Mortar	12.2	15.1	15.0	14.8	14.8
Tactical ADA	11.6	14.4	15.4	17.0	15.1
STINGER	4.6	6.1	6.7	6.7	6.7
Division HQ	1,385.0	1,711.0	2,105.0	2,105.0	2,105.0

b. These factors are used by the Force Design Model (FDM) along with other measures of effectiveness to design a combat force structure for a particular theater. Some number of alternative force structures designed by the FDM may then be selected and validated by a warfighting simulation in either the CEM or ATLAS Model. The selected theater force combat structures are "rounded out" and the entire structure costed and included with other theater force or forces for consolidation into the Objective Army Force.

9. FORCE DESIGN MODEL

a. The FDM uses sequential linear goal programing to solve the problem of designing a force which best satisfies the threat, mobility, and survivance goals while being constrained by limited resources. The general approach is a partitioning of the formulated measures of effectiveness with their associated goals into priority levels and the establishment of an objective function. The goal program attempts to minimize either the negative deviation, positive deviation, or both, from the predetermined goals. The priority levels must be satisfied, each to the maximum extent possible, in a pre-emptive fashion. This model exists now with approximately 600 rows by 700 columns. In the FDM, the measures of effectiveness are arranged into four priority levels or "packages" as shown in Figure 2. The arrows in Figure 2 indicate whether we want to maximize or minimize the particular characteristic. The individual characteristics within the priority "package" may be numerically weighted.

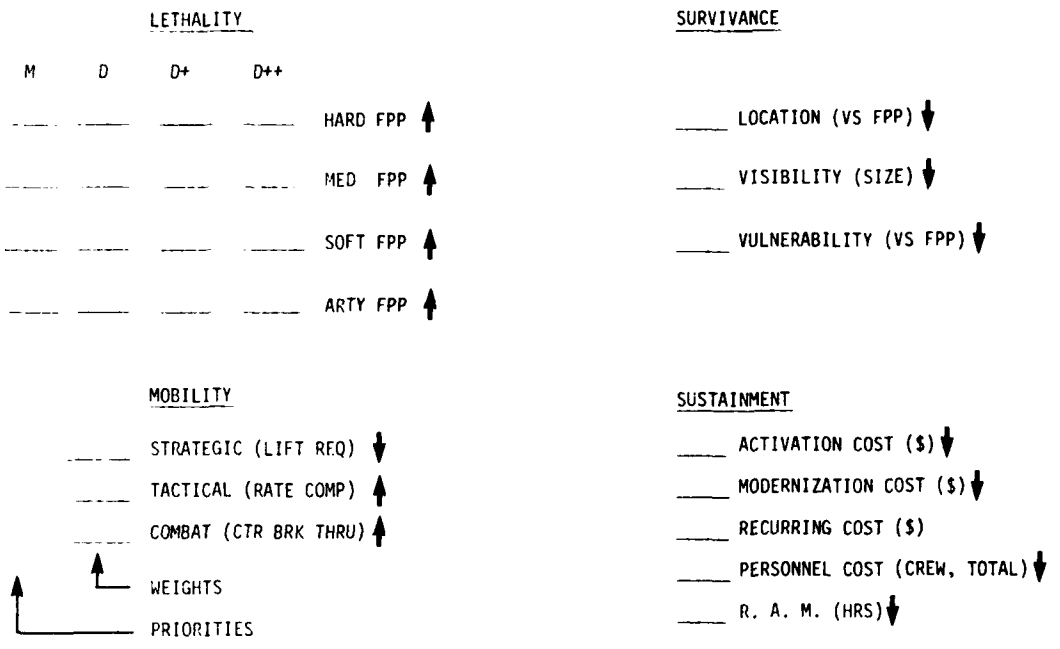


Figure 2. Measures of Effectiveness

b. Since the force is being measured by looking directly at the weapons (measuring the edge of the sword, so to speak, and presuming a relationship to the supporting structure--the hilt), the characteristics are organized in the manner used by a weapon or combat unit designer. That is, the force designer wants high lethality, high mobility, high survivance, but at low sustainment cost. These characteristics are desired in the weapon, in the unit, indeed in the whole combat force. The methodology allows the changing of priorities and weighting to suit the strategy of the force designer.

(1) Looking first at lethality, the model attempts to match the enemy firepower potential (FPP) score in a predator-prey relationship; that is, match separately the antitank (hard), antilight armor (medium), antipersonnel (soft), and artillery firepower potential of the US force to the total firepower of corresponding targets. Note that weapons themselves are not matched, but rather their performance is matched against opposing targets in terms of firepower potential.

(2) The mobility characteristics which have been considered are: strategic, where the weapon/unit is carried by air or sea; tactical, where the weapon/unit marches under its own mobility; and combat, where the weapon/unit must move firepower. Strategic mobility is measured using the FASTALS roundout requirement for lift in short tons. Tactical mobility considers three individual characteristics: unit mobility (a 100 percent mobile unit is favored over an 80 percent mobile unit); high average unit speed (a unit that averages 40 mph is favored over one that averages 30 mph), and unit incompatibility (a detractor from high average speed if the unit has disparate vehicles). Combat mobility utilizes the same counterbreakthrough coefficient used in IDOFOR I and previous studies. Basically it is an expression of a weapon's ability to counter a hypothetical Soviet division or combined arms army attack with weapon firepower, range, and weapon platform velocity.

(3) The survivance category consists of three characteristics to be minimized: first, the location on the battlefield of our weapon as opposed to the firepower potential of a "stylized" Soviet division; second, the relative size of our weapon compared to our other systems; and third, the relative vulnerability of our weapons compared to our other systems. The last characteristic is the reverse of the predator-prey relationship--it quantifies US weapons as the targets of the "stylized" Soviet division.

(4) The sustainment category contains the generally constraining factors of activation or high dollar cost--the cost of adding new weapons and new units to the force, and modernization cost--the cost of adding planned new weapons to existing units. In addition to these nonrecurring costs, each unit has a recurring cost coefficient according to status--Active or Reserve. The base case is costed using the Comptroller's Force Cost Information System (FCIS) for a particular year (FY 81 constant dollars in this case) and the cost factors are ascribed to each weapon using the "slicing" methodology previously described. Personnel constraints are binding on the total theater force, Active and Reserve, and the total crew of all weapons (it being considered generally better to minimize crew size). There is also a ceiling on the number of people stationed overseas in Europe, however, as for most goals in the model, it may be exceeded. The last factor is consideration of maintenance costs in terms of daily maintenance manhours required per weapon and associated platform.

c. These measures of effectiveness (MOE), arranged in priority, will produce a force structure solution reflecting their relative importance according to the designer's strategy or philosophy. Figure 3 is an example. The priority selected may be determined from a fitting of the priorities to a hypothetical scenario. In Figure 3 below is a description of a scenario starting on the left with peacetime. As the time schedule unfolds to the right, there appears the first vertical timeline of interest to the force designer, M-day, when mobilization occurs but the war has not actually been engaged. At D-day shooting starts, and the forces listed under the time blocks reflect those stationed in the theater on M-day, those people who must be deployed to join prepositioned equipment and, up to the D+ timeline, Active forces. D+ is an arbitrary point after which time Reserve forces can be force structured because they can arrive after that time. The model constraints reflect the lower recurring cost of Reserve units in peacetime; hence, the model is more able to match firepower with equal amounts of money with units in this category. The force is designed now for peacetime costs when the whole war scenario is hypothetical. The cost of acquiring and maintaining the Army is real. Above the horizontal lines are the MOE arranged in priority order to meet a particular posture (attack, defend, etc.); Figure 3 is an example. The model allows the designer to select priorities and postures.

d. Figure 4 displays a hypothetical level of enemy force structure at the heavy arrows. In a force structured with sustainment considerations in first priority and in the posture of "Red" attacking a prepared defense (RAPD), a particular "constrained" force is developed as shown by the lowest horizontal line. If the priorities are changed with lethality on top, sustainment on the bottom, and a specific posture selected, the resultant force should track along the arrows, exactly matching the enemy firepower potential and presumably at more "cost" than the constrained force. This force may be too large to acquire or maintain but it is still useful to examine because it gives the force designer insight into both "how much force is required," and also helps answer the question of what composition the force should have. Other options which consider changed priorities and postures, as depicted by the dashed lines, may also lead to unattainable force levels, but give insight into the composition of the resultant force structures. The FDM, as depicted in Figure 5 (with the goals on the left placed in priority and selected posture), produces a force composed of weapons in battalions within divisions, to total a particular theater force structure.

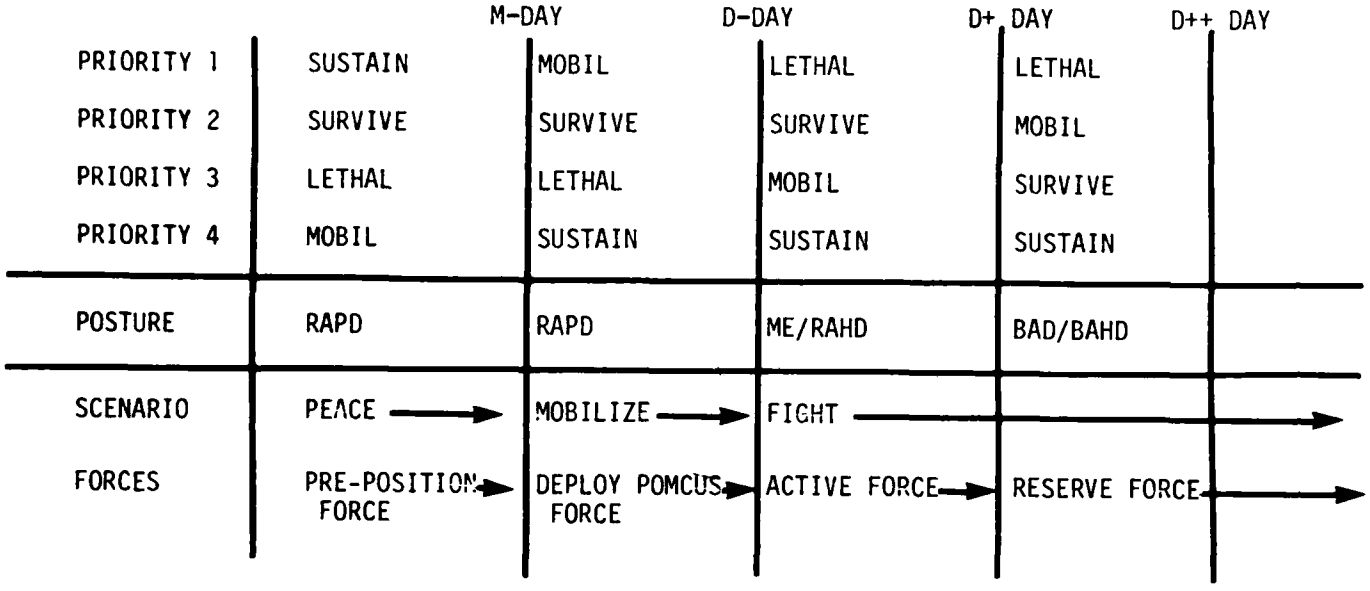


Figure 3. Time-phased Priority Structure

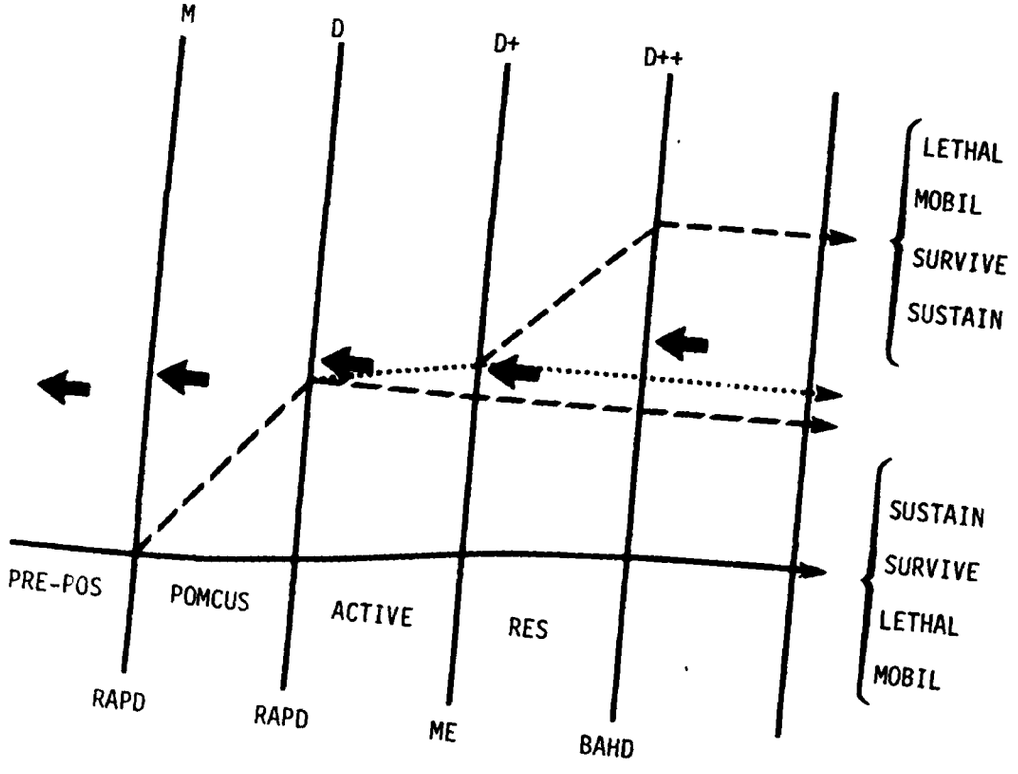


Figure 4. Time-phased Priorities/Postures

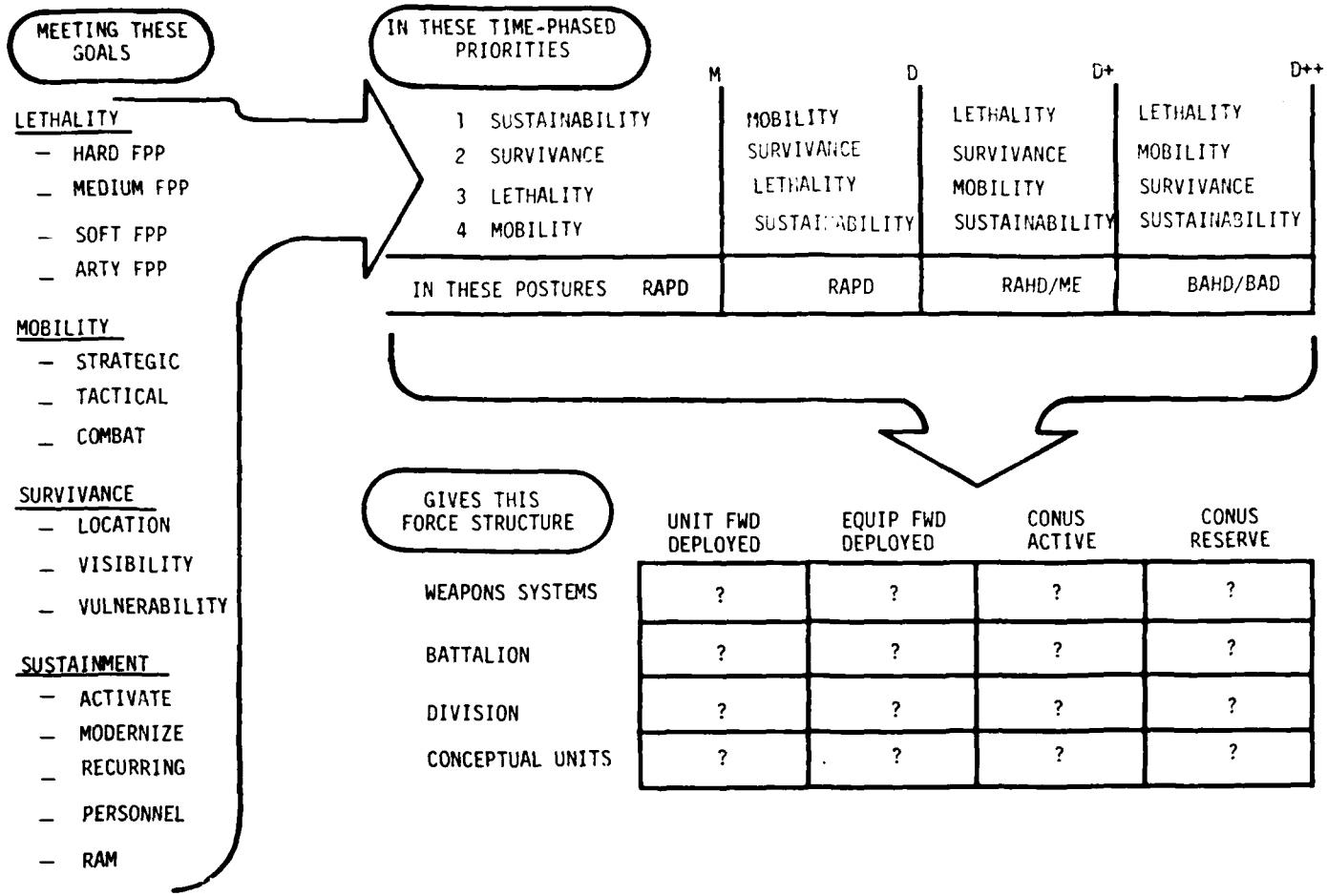


Figure 5. Force Design (Goal Program) Model

e. As simply described in Figure 6, the model operates at weapon, battalion, and division level simultaneously, trying to bring into solution weapons that achieve the firepower goals while expending the least resources. As a weapon is selected, for example, a tank, and builds up to 54, which equates to a battalion, relational rules force the addition of APCs and other "costs of doing business" associated with a tank battalion. At division level, only so many tank battalions can be in any selected division structure, mechanized infantry battalions, an air defense battalion, and division artillery battalions are all added to form weapons into battalions into divisions. Three divisions equal a corps. Corps units such as the corps aviation brigade (CAB) (one for each five divisions in the mature theater), armored cavalry regiments (ACR), air defense battalions, and field artillery groups are added by allocation rules. Since any one iteration may not be the optimal force design (the solution may have used up the resources before satisfying the design goals), the model develops many alternatives (for example, building up attack helicopters). Again, however, it must add the cost of doing business (in this case in terms of observation helicopters, etc.) and place the resultant battalion in any one of a number of defined division or corps level aviation units. The model will typically use several hundred iterations to settle on an organization meeting, or coming closest to meeting, the priority structure entered by the force designer. In IDOFOR II, the model considered 32 weapons or systems, 60 battalion types, and 33 division or separate regiment/brigade types including current Active and Reserve (National Guard) divisions, and the TRADOC conceptual Division 86 and Hi-Tech divisions.

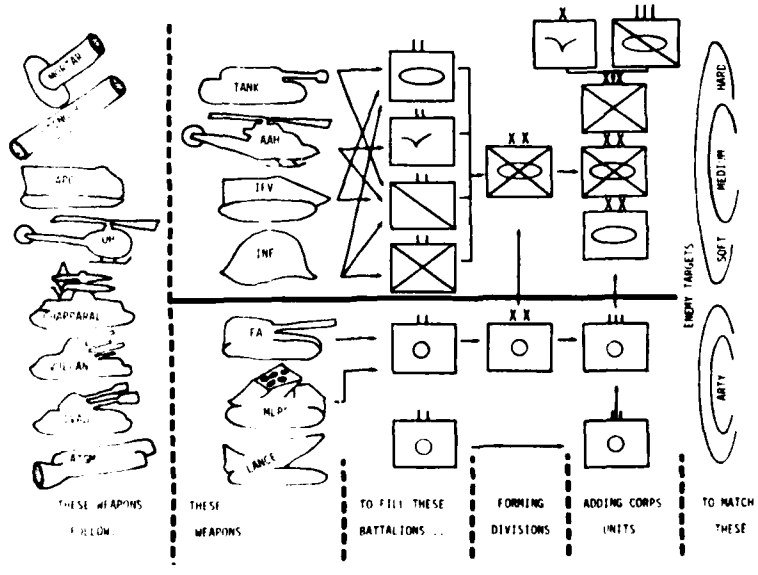


Figure 6. Force Design Model Operation

10. THEATER FORCE STRUCTURES

a. FDM output examples for various priority and posture schemes are displayed in Figures 7 through 10.

b. Figure 7 displays an example force designed with the sustainment considerations in first priority. The goals' "satisficement" in comparison with the base case are shown on the left. Since sustainment was in first priority, those characteristics would be met first. Note the same expenditure of recurring and nonrecurring dollars as the base case, with 4 percent less personnel used and some 7 percent less daily maintenance manhours. The second priority was lethality, and measured against the threat at the D++ timeframe, this force had 9 percent shortfalls in FPP in the hard and medium categories, 148 percent excess to the goal in the soft category, and a 25 percent shortfall in artillery FPP. The mobility characteristics were next in priority. In strategic lift requirements, this force is 68 percent heavier than the base case. In tactical mobility characteristics it has 20 percent fewer units overall at 100 percent mobility, 26 percent slower average speed, but 5 percent better unit compatibility. In the survivance category, this force is 26 percent better than the base case in terms of relative weapon location on the battlefield, 18 percent smaller overall, and 29 percent better in terms of "hardness" of weapons.

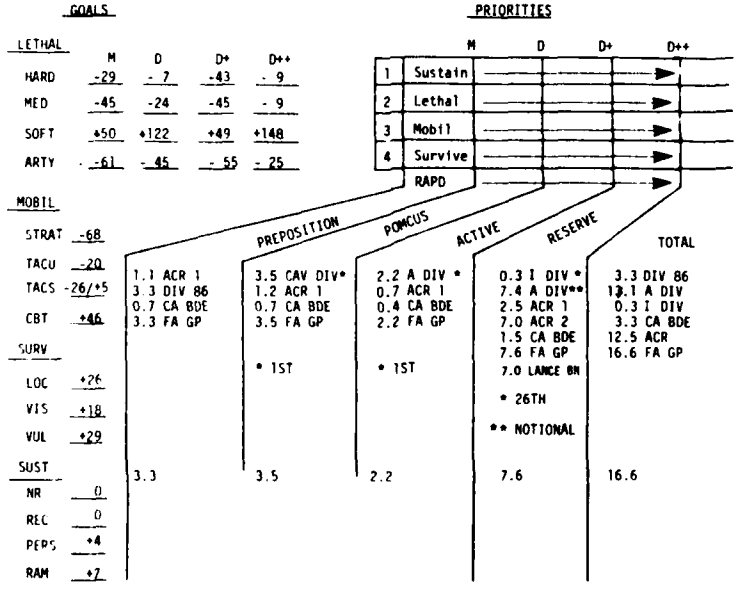
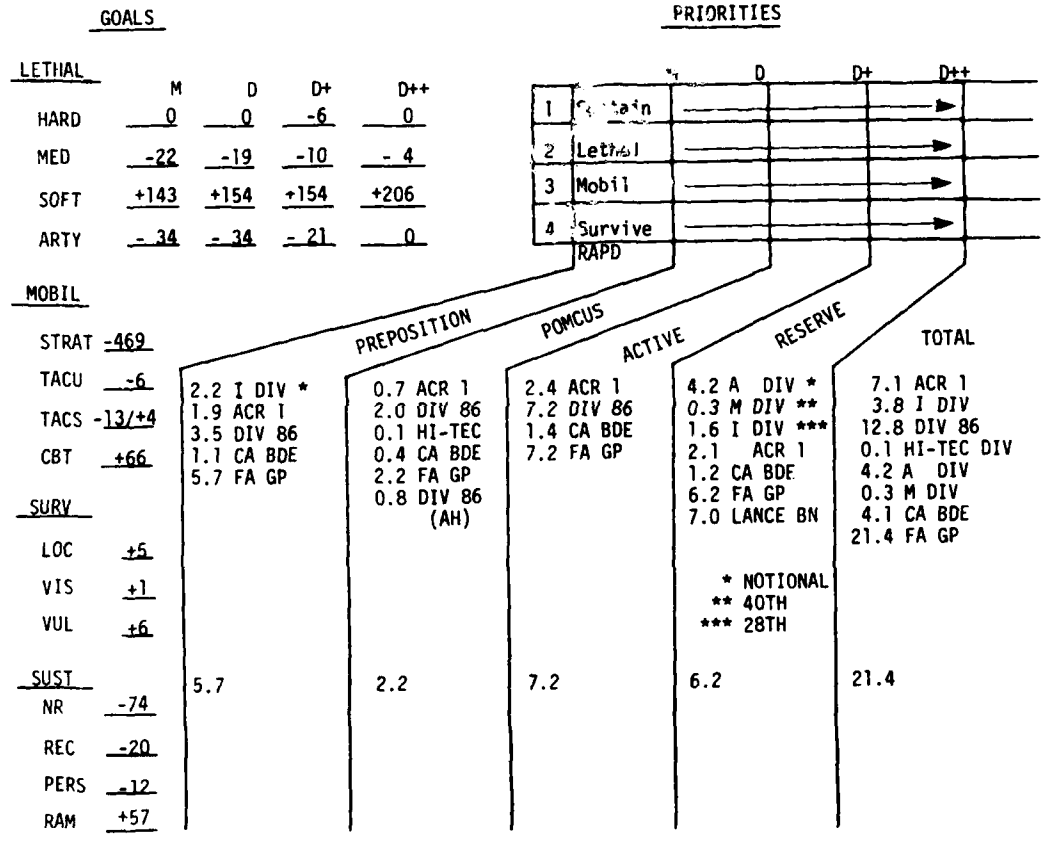


Figure 7. Force Design Example: Alternative Force

c. Figure 8 displays a force designed by increasing the amount of recurring and nonrecurring dollars by 5 percent a year for 10 years. The model used 74 percent more nonrecurring dollars than the base case and 20 percent more recurring dollars. This force is larger than the previously described force and has changed characterization from "Armored Division" heavy to "Division 86" heavy.



Fibure 8. Force Design Example: Five Percent Force

d. Figure 9 shows a force designed by rearranging the priority structure to place lethality in first priority. It meets or exceeds the lethality goals in all timeframes but at the "expense" of the goals placed in lower priorities.

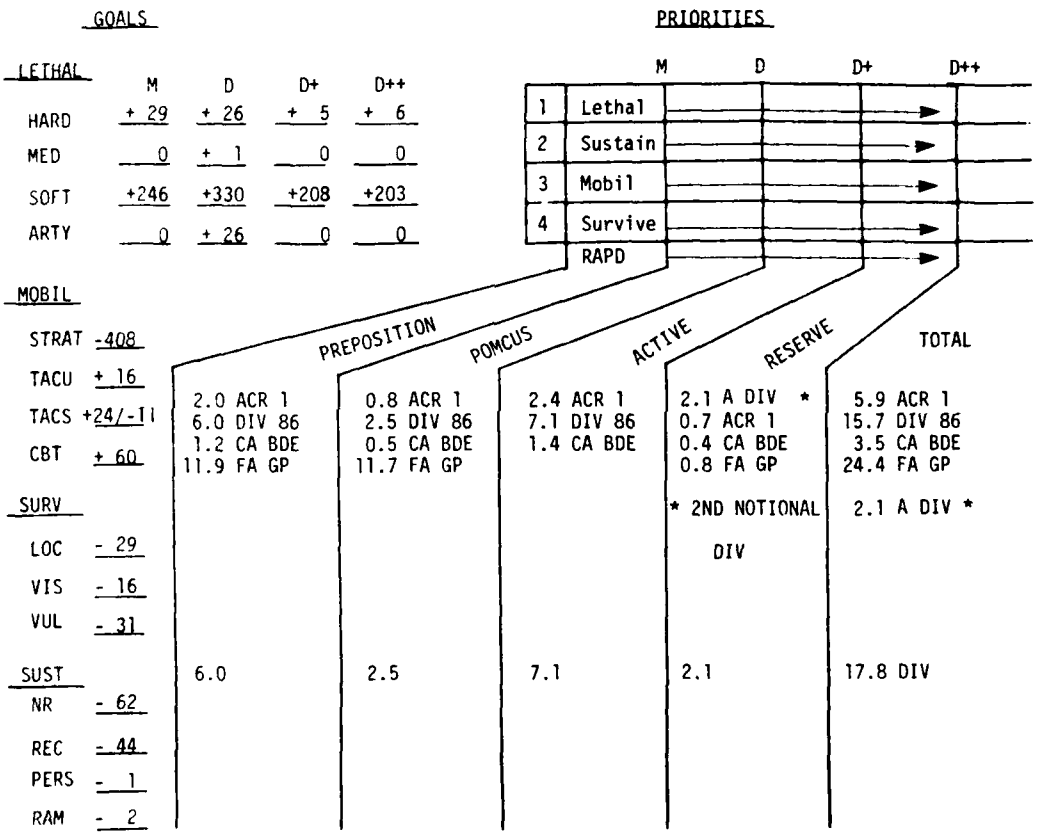


Figure 9. Force Design Example: Minimum Risk Force

e. Figure 10 displays a force designed by changing both the priorities and postures. The posture considered in the D to D+ timeframe is "meeting engagement" (ME), and in the D+ to D++ timeframe, the posture is "Blue against a Red delay" (BAD). Additional forces in parenthesis are shown as a result of the meeting engagement posture being used in this last timeframe.

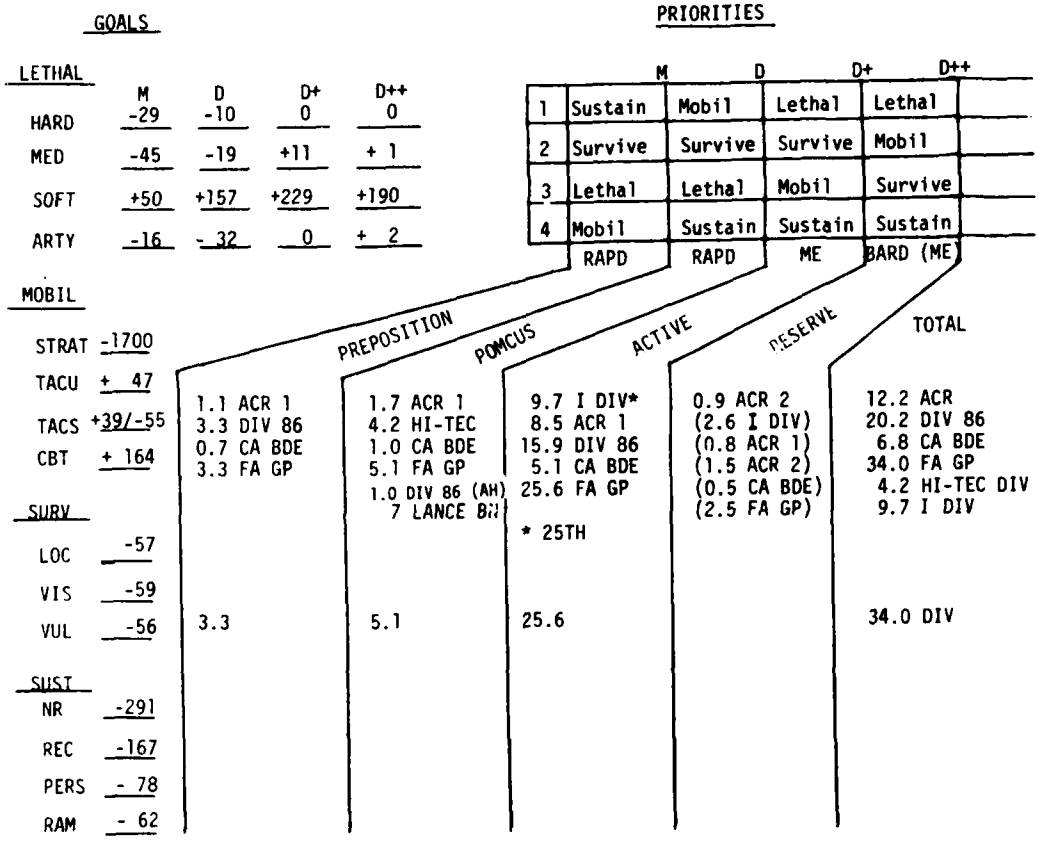


Figure 10. Force Design Example: Phased Force

f. Figure 11 shows the warfighting simulation results from the CEM.

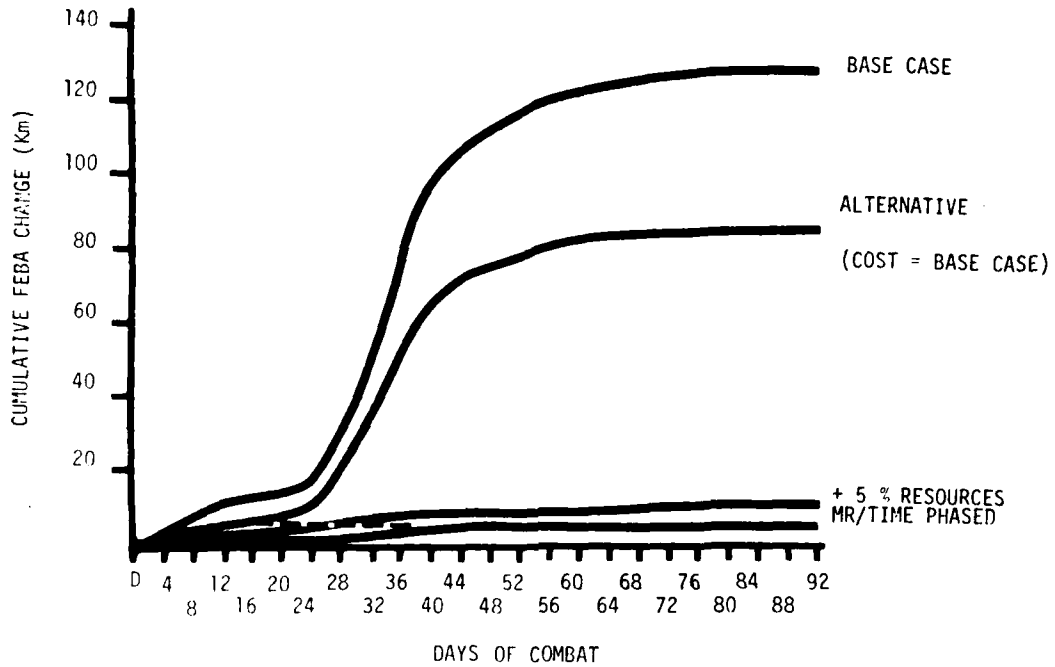


Figure 11. Concepts Evaluation Model Results

11. RISK ANALYSIS. All of the IDOFOR methodology heretofore discussed used deterministic models (which is to say simply that a given input would produce exactly the same output each time). Risk analysis is done using a stochastic (probabilistic) model, a network simulation using the Venture Evaluation Review Technique (VERT), similar in format to the Program Evaluation Review Technique (PERT). Each force is evaluated through 500 iterations, given the probabilities for the factors listed in Table 2. The results for the Europe Base Case and the three alternative forces are shown in Figure 12. If a point 100 kilometers from the initial FEBA were of interest, it can be seen that the alternative force had a 35 percent risk of not being able to maintain the FEBA forward of the 100-kilometer line at the end of 30 days, given that the force started at the FEBA, or they did not hold 35 out of 100 times. Note the other alternative forces are "Zero Risk" for this point; that is, they held in 500 replications each time.

Table 2. Risk Analysis Factors

Warning time
Readiness
Transportation
Training
Probability of closure on POMCUS
Probability of POMCUS overrun
Variation on Red Threat
Warfighting capability

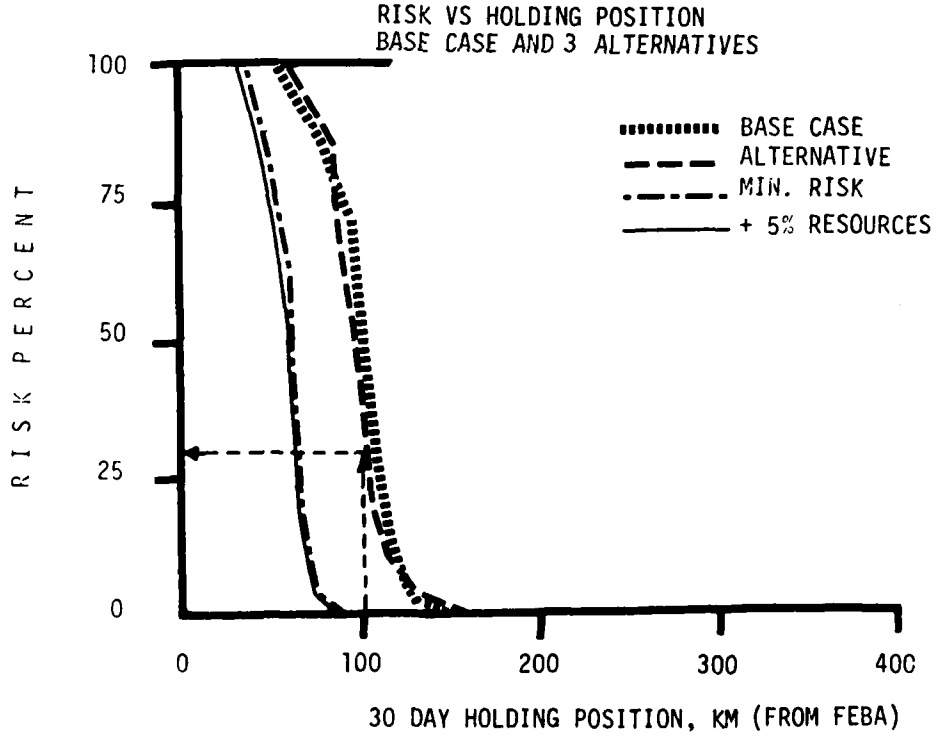


Figure 12. Risk Analysis

12. ALTERNATIVE OBJECTIVE FORCES. The Extended Planning Annex to the Army Program Objective Memorandum specifies the current objective force and the estimated resources expected to field this force out to the 1997 timeframe. Using this guidance, theater force structures can be designed, as the examples shown in this volume have been, for inclusion into an Objective Army Force. An Example Army Objective Force is detailed in Section V of Chapter 5, Volume II, Main Report (SECRET).

13. ACQUISITION STRATEGY MODEL (ASM). The next consideration for the IDOFOR II methodology was, "How may the force be transitioned from the current or programed Army to the far mid-range objective Army?" This last phase in the methodology uses another goal program model which takes the force designed by the Force Design Model as part of its input. Using weapons, personnel, and dollar resources as constraints, it develops a time-phased force structure of weapons, battalions, and divisions that not only smoothly transitions from a 1985 starting force to the selected 1992 force design, but that also minimizes the threat shortfall during the transition years.

a. The Acquisition Strategy Model consists of a series of semi-autonomous mini-force design models, linked by an information flow. The mini-force design model has two measures of effectiveness, lethality and sustainment, and therefore only two priorities in the goal program, with sustainment always first. The output for each of the transition years is in terms of Active and Reserve Component weapons, battalions, and divisions.

b. The model was exercised to determine the acquisition strategy for one of the variations of the Europe 5 percent force (Figure 13). This force structure, using hard firepower as a point of comparison, achieved 100 percent of its 1992 hard firepower goal. The 1985 starting force, which achieved less than the 1985 hard firepower goal, was developed by modernizing the Europe designated current force out to 1985 by using the Force Definition (FORD) Model. All of the current Active Component division types will phase out by 1992 to be replaced by 13 Division 86s (types 6 and 4). The 15 Reserve divisions (8 Reserve Component divisions plus 7 notional Reserve divisions) will be replaced by 3.5 armored divisions (such as the 49th AD) and 2 infantry divisions (such as the 47th ID).

d. The acquisition strategy for this 5 percent Europe force is summarized in Table 3. The actual model output is quite detailed and specific as to which division by type is in the force structure during the transition years. The model did provide a list of forces that were affordable, according to the resource availability that was input, and that quickly moved to minimize the threat shortfalls.

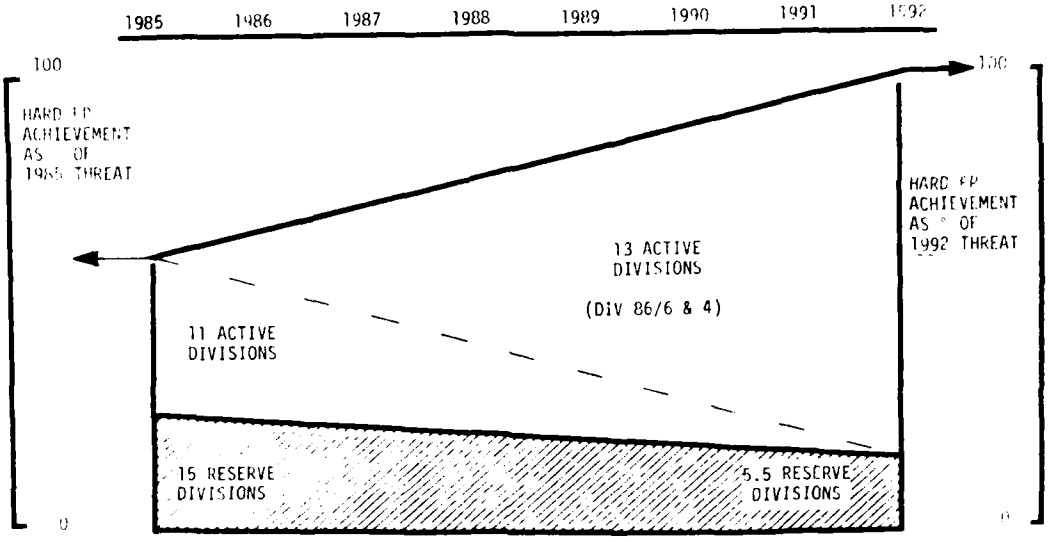


Figure 13. Acquisition Strategy Example: Five Percent Force

Table 3. Force Transition

		85	86	87	88	89	90	91	92
Active divisions	ID	2	2	2	1.5	1	0	0	0
	AD	4	3	3	3	3	3	2	0
	Mech	5	4	3	3	3	2.5	1	0
	86/6+4	0	2	4	5.5	7	9	11	13
	Total	11	11	12	13	14	14.5	14	13
Reserve divisions	ID	6	2	2	2	2	2	2	2
	AD	6	7.5	7	6	5	4	4	3.5
	Mech	3	1	1	1	1	0	0	0
	Total	15	10.5	10	9	8	6	6	5.5
Active FA gps		10	12.5	15.5	15.5	17.5	20	22.5	26
Reserve FA gps		8	0	0	0	0	0	0	0

e. The model also provides a list of equipment requirements for each year. This information provides insight as to the modernization tradeoffs that take place internally in the model logic as well as the equipment acquisition requirements and inventory flow during the studied years.

14. DISCUSSION OF ESSENTIAL ELEMENTS OF ANALYSIS

a. Can the results of Army long-range planning be incorporated into IDOFOR methodology? Yes. The methodology allows the input of alternative future strategies and environments as reflected in varying force structures and scenarios. The alternatives can each be compared against a "base case" and each other to highlight differences in effectiveness in warfighting simulation, resources expended, risks incurred, and force structure requirements.

b. Does the methodology produce products useful to mission area analysis? Yes. The alternative theater force structures after design, warfighting simulation, and rounding out provide a list of units which may guide mission area analysis for consideration of alternative force structures. The FORD Model can modernize a given structure with alternative strategies to provide insight into mission area support required with varying levels of modernization. The FDM can include individual characteristics in both the design and comparison of force structures. For example, daily maintenance manhours at direct support and general support level for each weapon considered in the design of combat forces was a variable in the FDM. This indicator of maintenance support required for a theater force can be used to compare an alternative versus a base case to give insight into future mission area support required for a particular alternative.

c. Can IDOFOR provide useful insights for combat development activities within DARCOM and TRADOC? Yes. The ability to compare an alternative force developed by the FDM against a base case gives insight at all levels of force structured in the model--weapon, battalion, and division. For example, the output of FPP versus the threat in terms of hard, medium, soft, and artillery FPP could give insight into ammunition types and quantity. The improving of artillery FPP to affect "hard" versus "soft" targets would change the firepower calculation to better meet a "hard" FPP goal versus a "soft" goal and thus increase the effectiveness of any given force without change in structure. The FDM considers structuring with some 33 weapons in some 60 battalion types in some 30 division and regimental structures. The model may be used to compare any conceptual unit by varying the weapons (numbers and types) in battalions and/or varying the battalion and division structures. Currently, the model has the definitions of the TRADOC conceptual Division 86 series as "candidate units." The theater force structures derived from the model should give insight both as to how many of a particular type unit are required for a particular theater scenario, and what would be the most effective or effective-at-least-cost type unit in a given level of force structure.

d. Is the IDOFOR methodology transferrable to design of joint forces? Yes. The methodology may be used to design the ground forces for inclusion in the Joint Strategic Planning System. The FDM may design against a threat goal which is not attrited to determine a "total requirement" or the threat may be attrited in warfighting simulation so as to reflect, for example, air interdiction. The FDM could then design a ground force meeting this lesser goal.

e. Can IDOFOR methodology quantify risk relative to potential of C^2 and automation and communications initiatives as battlefield force multipliers? Partly. Risk analysis is accomplished by using a computerized statistical network analysis--the VERT. For each theater structure, a separate analysis is undertaken. The probability of C^3 degradation is one of the factors considered, so the relative sensitivity of each alternative versus the base case can be assessed. But in force structuring--the output of the FDM--there exists no "multiplier effect," as each organization considered is at its "design capability" by definition.

f. Can the IDOFOR methodology give full recognition to contribution of engineer support in theater-level simulation? Partly. Total engineer support encompasses several major tasks including minefield emplacement supervision, obstacle and barrier construction, preparation of defensive positions, LOC maintenance, and facility construction. The methodology now has the capability to recognize the ability of various types of units or forces to emplace minefields, and, given a suitable MOE, can consider this unit capability in the structuring of forces. The quantification of the other tasks listed in terms of their contribution to force effectiveness has not been accomplished. When a scheme for achieving this quantification is developed, the IDOFOR methodology has sufficient flexibility to incorporate the results in its force design methodology.

15. ACCOMPLISHMENTS. This second phase of the IDOFOR methodology development incorporates a number of methodological improvements. These are summarized here and explained in detail in Volume II of the report.

a. The Force Definition Model. The FORD Model is a collection of computer programs used for planning force modernization. It was first operational in IDOFOR I. Several improvements were made in IDOFOR II, including first use of conceptual units. FORD begins with a troop list of the force, current assets, and a delivery schedule of new equipment. The force is updated according to current plans or user specification. The new equipment available for that year is distributed to the highest priority units. Equipment replaced is distributed to lower priority units, and this, in turn, generates replacement equipment for yet lower priority units.

b. The Force Design Model. The force design process has been significantly improved in two specific areas. First, the goal programing tool used in IDOFOR I, which was based on a modified textbook algorithm, was replaced with a sequential linear goal program (SLGP) using the UNIVAC Functional Mathematical Programing System (FMPS). The prime advantage accrued by this change has been the capability to expand the problem dimensions from the 50-row by 90-column representation to a several hundred-row by several hundred-column matrix. Secondly, the FDM has been refined to include weapon, battalion, and division variables for both Active and Reserve Components in the same problem formulation. This has been accomplished for both Europe and Southwest Asia (SWA) contingencies. In IDOFOR II, specific weapons were used (e.g., M60A3, M1-105, M1-120, etc.) in contrast to the weighted average, stylized weapons (e.g., tanks, artillery, etc.) used in IDOFOR I. This detail was extended through battalion and division combat organizations by explicit specification of the number per type major weapon system in those levels. For example, expansion of the problem due to SLGP enabled the representation of 33 competing division types in IDOFOR II versus 8 division types in IDOFOR I. Additionally, several new measures of effectiveness representing tactical mobility, survivance, and equipment maintenance were added to the FDM.

c. The Acquistion Strategy Model. The ASM, a linear goal program of some 1,700 rows and 2,000 columns, is a new model. Constrained by projected availability of resources, and driven by the necessity to meet the estimated threat as quickly and consistently as possible, the ASM presents an orderly transition of a near term force structure to a selected 1992 force design. The ASM delineates annual equipment requirements, force definitions, and firepower achievement, as well as provides insight into resource allocations during the transition years.

d. The Risk Analysis (VERT) Model. For IDOFOR II, because of the increased complexity of the risk analysis, the capacity of the VERT Model was increased by a factor of three. Algorithms were developed so that any combination of statistical distributions can be used to represent an element of risk. For example, in Southwest Asia where terrain features are important, the improved VERT capability permitted terrain, combat posture, and fortification time to be made integral parts of the risk analysis. This separate risk analysis provides a stochastic or statistical technique to assess the sensitivity of force structures to off-design factors.

APPENDIX A

STUDY CONTRIBUTORS

A-1. STUDY TEAM

a. Study Director

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b. Team Members

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APPENDIX B

STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF DAMO-SSW

16 OCT 1980

SUBJECT: Army Mid-Range Planning

Commander
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20014

1. STUDY TITLE. Study for Improving the Definition of the Army Objective Force Methodology, Phase II (IDOFOR II).

2. REFERENCES.

a. CSR 5-11, 25 May 1973, subject: Management of the Automated Force Planning System.

b. CSR 11-1, 25 November 1974, subject: The Planning, Programing, and Budgeting System.

c. AR 1-1, 25 May 1976, subject: Planning, Programing, and Budgeting within the Department of the Army.

d. AR 5-5, 5 July 1977, W/C1 dtd 15 April 1978, subject: The Army Study System.

e. AR 10-38, 15 November 1978, subject: United States Army Concepts Analysis Agency.

f. JCS Memorandum of Policy No. 84 on the Joint Strategic Planning System, 14th Revision, 14 August 1979.

g. Memorandum, DAMO-SSW, SAB, dated 13 August 1979.

3. DEFINITION. The Army objective force is defined as an achievable long-range US Army force required to successfully execute Army missions in support of the national military strategy. The methodology used to develop this force will employ improved analytical methods for force design, evaluation, acquisition, costing, and assessment of risk.

4. BACKGROUND.

a. The Planning, Programing, and Budgeting System (PPBS), long range planning, combat developments process, force design activities, and realities of resource

DAMO-SSW
SUBJECT: Army Mid-Range Planning

and time constraints discussion included in the background section of reference 2g (IDOFOR I Study Directive) apply equally to this study directive.

b. Mid-range combat force structuring is an evolutionary process that began with the Conceptual Design for the Army in the Field (CONAF) series of studies. CONAF I through V coupled with the Trade-off Analysis System/Force Mix (TRANSFORM) Study provided the basis for developing the conceptional force design methodology in IDOFOR I.

c. IDOFOR developed an interactive methodology that provides top-down force structuring of alternative objective forces in the far midrange period. The methodology developed during IDOFOR I employs parametric force analysis to warfight, cost, man, equip and quantify risk between alternative force mixes for theater level conventional warfare in NATO. IDOFOR methodology consists of three stages:

(1) The force partitioning stage projects and modernizes a given combat force out to the design year in accordance with applicable procurement and distribution plans. The warfighting capabilities of the modernized combat force are evaluated in the Concepts Evaluation Model (CEM), and the Force Analysis Simulation of Theater Administration and Logistic Support (FASTALS) model identifies support structure requirements. This force is then described in terms of cost, manpower, and strategic lift requirements. Similar descriptors are generated to describe system slices.

(2) After the force partioning stage allocates resource requirements among system slices, the force design stage recombines the slices employing the multi-objective optimization technique of linear goal programming to attain a desired level of combat power. As alternative forces are generated, they are compared in terms of their level of achievement of the design goals. IDOFOR methodology also evaluates risks associated with force structure options.

(3) The force acquisition stage develops a strategy to build the initial force into the selected objective force. This stage employs both goal programing and prioritized design goal methods. A prototype force acquisition strategy was conceptualized during Phase I.

d. IDOFOR I methodology development incorporated a number of methodological improvements over the preceding CONAF studies. They include:

(1) The force modernization process was improved with the completion and implementation of the Force Definition (FORD) System which employs computer programs to modernize a force.

(2) The force partitioning process was improved by: generation of slice coefficients for both fully supported and for host nation supported force structures; definition of additional system slices for the division headquarters,

for utility/cargo helicopters, and for scout/observation helicopters; restructuring of the scout/infantry slice; clarification of the air defense slice; and consideration of additional cost requirements for high cost ammunition.

(3) The Force Design Model was expanded to consider a number of new functions and to better analyze those previously included. New functions have been incorporated for Reserve Components, prepositioned war reserve materiel stocks, high cost ammunition, and prescribed force balances in the force structure. The approach used to generate and evaluate the counterbreakthrough/offensive mobility coefficients of the force was greatly expanded.

(4) Two methods were developed to evaluate the risk associated with force structure options. The first method uses network simulation, the Venture Evaluations and Review Technique (VERT) to assess risk that a force does not perform to its designed level. The second method compares the achievement vector from the force design model with the results of CEM simulations of earlier force designs to assess risk incurred when the designed level of the force is less than the desired capability of the force. Both methodologies are in prototype form.

5. LITERATURE SEARCH. A partial list of data sources relevant to this effort includes:

a. Sources identified in paragraph 5a through g of reference 2g (IDOFOR I Study Directive).

b. Study for Improving the Definition of the Army Objective Force Methodology (IDOFOR I), Volumes I and II, July 1980.

c. Army-Wide Mission Area Analysis (MAA) Study.

d. Review of Army Analysis Study.

e. Nuclear/Chemical System Program Review.

f. IDA Integrated Battlefield Study.

g. Army Strategic Appraisal.

h. Prototype Army Long Range Appraisal (PALRA) (In progress).

i. Army 86 Transition Plan.

j. Combat Support Balance Study (CSBS).

k. Total Logistics Readiness/Sustainability (TLR/S).

DAMO-SSW
SUBJECT: Army Mid-Range Planning

l. Theater Integrated Warfare Scenario Study (TIWSS) (In progress).

m. Long Range Research, Development and Acquisition Planning (In progress).

n. An Analysis of Some Key Assumptions Behind Army Force Planning (ASSUMPTIONS) (In progress).

6. STUDY SPONSOR. Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS).

7. STUDY AGENCY. US Army Concepts Analysis Agency (CAA) in coordination with US Army Training and Doctrine Command (TRADOC) and the Army Staff.

8. TERMS OF REFERENCE.

a. Problem: The Army requires improved methodologies to support the exercise of its planning responsibilities within the PPBS. Current methods lack the scope and richness of choice necessary to define comprehensively the kind of Army which is both required and affordable in the mid-range period. While elements of the required methodologies are available--resource projection, conceptual force design, combat developments--they have not yet been focused collectively on the problem of defining an objective Army force. This must be done in such a way that programers and planners can have a clear indication of Army priorities to guide the development of investment strategies, programing goals, and program priorities.

b. Purpose: To continue the development of an improved methodology for the design and evaluation of the Army objective force which will provide an interface between mid-range and long-range planning, 10-12 years in the future. Additionally, the methodology can be used to analyze any designated force from the program force through the planning force.

c. Objectives: To develop an interactive methodology involving CAA, the Army Staff, and TRADOC that expands IDOFOR I methodology to include warfighting analysis of a non-NATO scenario and provides alternative force designs for selection of an Army Objective Force.

(1) Fully develop IDOFOR I risk assessment methodology applicable to a NATO and non-NATO scenario.

(2) Fully develop IDOFOR I acquisition strategy for a specified design force to be selected from the alternative force designs considered.

d. Scope:

(1) This study will continue the development of the IDOFOR I methodology and resultant products applicable to the deployable Army (Active and Reserve

Components) for conventional combat in non-NATO scenarios and will develop the connectivity between IDOFOR I (NATO) and IDOFOR II (non-NATO) methodologies.

(2) The methodology will be structured to incorporate follow-on study efforts of this series to:

(a) Expand the worldwide methodology to include an integrated battlefield option based on development of an integrated battlefield scenario by reference 51.

(b) Expand the worldwide methodology to encompass the Total Army and assist in developing guidance for the sustaining base and all force-related programs in the POM.

(3) This methodology will exploit and improve existing techniques. It will incorporate current aspects of the JSPD Analyses and replace that effort in FY 1982. The point of departure is the revitalized long-range planning effort which will provide a necessary backdrop and source of ideas for this effort.

(4) The product requirements will be cyclical, but will not necessarily be required on a fixed annual recurring schedule. This product and subsequent applications of the methodology will be documented and will provide an analytic basis for staff analysis. Analytical products produced by the methodology are expected to have a shelf life of 2 years or more.

(5) The improved methodology must have embedded in it the capability to ascribe funding and other resources to each future objective force design considered. Cost estimates must be attributable to each fiscal year in terms of recurring and nonrecurring costs. The resource model must be capable of relatively rapid use for gross force comparisons.

(6) The improved methodology will provide, as an adjunct to its primary aim, for specific analysis to be done in response to special tasking requirements prepared by the Army Staff in coordination with CAA. The purpose of this capability is to respond to emerging real-time force issues facing the Army by exploiting the force methodology to obtain quick reaction products.

(7) Development of major forces input to the Joint Strategic Planning System (JSPS) in the form of force requirements, a planning force for the JSPD and major forces input to the PPBS in the form of Army objective and program forces, together with a programing strategy for the Army POM, will be accomplished independently by the Army Staff based on products of this methodology.

e. Approach: The continuing methodological development should retain viable features of the current JSPD Analysis and IDOFOR I. These features should provide a point of departure for a higher level of integral resource analysis and the

DAMO-SSW
SUBJECT: Army Mid-Range Planning

development of conceptual improvements. Minimum requirements to be reflected in the improved methodology are as follows:

(1) Develop a fully structured and fully supported objective force base case for the area considered.

(2) Design a base case with alternatives which define points in a multidimensional force/resource/concept matrix.

(3) Cost the objective force base case using the IDOFOR methodology by projection of the FY 80 Army force into the future in consonance with current HQDA plans and programs. Cost projections should be accomplished using constant dollars.

(4) Identify measures of effectiveness applicable to the deployable Army which are sensitive to support structure as well as fire power and weapons systems. Methodology should provide quantifiable measures of force effectiveness to the extent possible, but must also provide for judgmental analysis of intangibles; e.g., people programs vs. hardware.

(5) Examine the sensitivity of alternative force performance to changes in the size, rate of commitment, and qualitative characteristics of the threat.

(6) Develop a 1992 Army objective force in detail for a non-NATO/NATO connected scenario, which is packaged and prioritized to show application of program assets to achieve to the maximum the inherent capabilities at each step of its development through the mid-range period.

(7) The characteristics and capabilities of the objective force will be identified. Areas for addressal should include, but are not limited to:

(a) Investment (dollar costs and other resource requirements).

(b) Structure/support.

(c) Manning.

(d) Organization.

(e) Deployability and basing.

(f) Mobilization

(g) Sustainability.

(h) Equipment.

DAMO-SSW
SUBJECT: Army Mid-Range Planning

(i) Overall warfighting capability.

(j) Command and Control.

(k) Automation and Communications.

f. Timeframe: The methodology will be applicable to force development in the mid-range extending to 12 years in the future. The methodology must be able to focus on intervening specific years of the time horizon when required to satisfy needs for special force analyses.

g. Assumptions:

(1) The current organization and functions of the Army, JCS, and OSD will remain basically unchanged.

(2) Army force planning will remain focused on NATO first preceded by an increased capability to respond to non-NATO contingencies.

(3) The sequential characteristics of the PPBS will remain essentially unchanged.

h. Essential Elements of Analysis:

(1) Can the results of Army long range planning be incorporated into IDOFOR methodology?

(2) Does the methodology produce products useful to Mission Area Analysis?

(3) Can IDOFOR provide useful insights for combat development activities within TRADOC and DARCOM?

(4) Is the IDOFOR methodology transferable to design of joint forces?

(5) Can IDOFOR methodology quantify risk relative to potential of C^2 and automation and communications initiatives as battlefield force multipliers?

(6) Can the IDOFOR methodology give full recognition to contribution of engineer support in theater-level simulation?

9. RESPONSIBILITIES.

a. Army Staff.

(1) DPAE, OCSA will:

(a) Provide a respresentative to the Study Advisory Group (SAG).

DAMO-SSW
SUBJECT: Army Mid-Range Planning

(b) Project program funding levels for the timeframe under consideration.

(c) Provide POC for changes to programing cycle.

(d) Provide guidance on PPBS to ensure timely impact on study or process.

(2) Force Modernization Coordination Office, OCSA, will provide a representative to the SAG.

(3) ODCSOPS will:

(a) Establish a SAG IAW AR 5-5.

(b) Provide the chairman for the SAG.

(c) Provide guidance on assumptions, scenario, and force postulations for the timeframe under consideration.

(d) Provide guidance on equipment expected to enter the force during the timeframe under consideration.

(e) Provide guidance on combat support and service support postulations during the timeframe under consideration.

(f) Provide guidance on strategic mobility as required.

(g) Provide guidance on command and control capabilities for the force structure during the timeframe under consideration.

(h) Provide guidance with regard to host nation support.

(4) ODCSPER will:

(a) Provide a representative to the SAG.

(b) Provide guidance related to personnel availability.

(c) Provide related personnel cost projections.

(5) ODCSLOG will:

(a) Provide a representative to the SAG.

(b) Provide guidance on logistical doctrine to be utilized.

(c) Provide guidance in determining logistic requirements and capabilities during the timeframe under consideration.

DAMO-SSW
SUBJECT: Army Mid-Range Planning

(d) Provide guidance on POMCUS and War Reserve Stocks with regard to the availability and distribution of equipment.

(6) ODCSRDA will:

(a) Provide a representative to the SAG.

(b) Provide projected cost data for materiel and weapons systems under development and fielded during the timeframe under consideration.

(c) Provide materiel planning data.

(7) OACSI will:

(a) Provide a representative to the SAG.

(b) Approve the threat.

(8) OCOA will:

(a) Provide a representative to the SAG.

(b) Provide technical assistance in developing cost methodologies for the study.

(c) Review the costing methodology.

(d) Review cost inputs to the study.

(e) Provide POC for changes to budget cycle.

(9) OCE will:

(a) Provide a representative to the SAG.

(b) Provide guidance on requirements and capabilities of the engineer force structure for the timeframe under consideration.

(c) Provide guidance on the feasibility of recognizing engineer support in theater-level simulations.

(10) OTSG will:

(a) Provide a representative to the SAG.

(b) Provide guidance on requirements and capabilities of the medical service structure for the timeframe under consideration.

(11) OACSAC will:

(a) Provide a representative to the SAG.

(b) Provide guidance on telecommunication capabilities.

(12) OCNGB will:

(a) Provide a representative to the SAG.

(b) Provide guidance with regard to National Guard Forces.

(13) OCAR will:

(a) Provide a representative to the SAG.

(b) Provide guidance with regard to Army Reserve forces.

(14) TAG will:

(a) Provide a representative to the SAG.

(b) Provide guidance on combat service support postulations which fall within AG functional areas of responsibility.

b. TRADOC. Request CDR, TRADOC:

(1) Identify points of contact within his command to consult with CDR, CAA on the improved methodology.

(2) Provide a representative to the SAG.

(3) Participate in the development of force structure alternatives for evaluation by the methodology.

(4) Assist in the evaluation of the products of the methodology.

(5) Designate and task agencies of TRADOC to participate in the application of this methodology on a continuing basis.

(6) Task Combined Arms Combat Developments Activity to provide a representative to the SAG.

c. INSCOM. Request CDR, INSCOM:

(1) Provide a representative to the SAG.

DAMO-SSW
SUBJECT: Army Mid-Range Planning

(2) Produce and validate the threat for the timeframe under consideration.

(3) Provide the current and projected organization of allied/friendly forces for the timeframe under consideration.

d. It is anticipated that DARCOM, FORSCOM, and USAREUR will be requested to support this project in an advisory capacity as the methodology matures.

10. ADMINISTRATION.

a. Any funds required will be provided by the parent agency.

b. Control:

(1) Study sponsor's representative and Chairman of the SAG is Chief, War Plans Division, Strategy, Plans, and Policy Directorate. The SAG will be composed of representatives of those agencies assigned specific responsibilities and those desiring observer status.

(2) In-progress reviews (IPRs) will be held as required.

(3) Coordination with TRADOC for support of this action is authorized and encouraged.

(4) Point of contact is LTC C. H. Armstrong, ext. 74164.

(5) The study sponsor will prepare the DD Form 1498.

c. Schedule:

(1) The study plan will be presented to the SAG within 45 days after publication of this directive.

(2) Expansion of IDOFOR I methodology to include non-NATO scenarios is to be developed by March 1981.

(3) A set of objective force alternatives for an IDOFOR I and II connected scenario will be presented to the SAG by May 1981. The Army objective force will be selected and considered when developing the JSPD FY 1984-1991 planning force.

(4) The acquisition strategy and risk assessment methodology are to be fully developed and presented to the SAG for the Army objective force by July 1981.

(5) A final report will be provided 30 September 1981.

CAA-SR-81-17

DAMO-SSW
SUBJECT: Army Mid-Range Planning

1. This directive has been coordinated with CAA in accordance with AR 10-59.

GLENN K. OTIS
Lieutenant General, GS
Deputy Chief of Staff
for Operations and Plans

CF:
ASA(M&RA)
SAUS(OR)
TRADOC
INSCOM
DAAG
DARCOM
DACS-DP
DAMO-FD
DAMO-OD
DAMO-RQ
DAMO-SSA
DAMO-SSM
DAMO-SSP
DAMO-NC
DAMO-ZD
DAMO-ZF
DAAC
DAPE
DALO
DAMA
DACA
DAMI
DAEN
DASG
NGB
DAAR
DAIRO

APPENDIX C

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GLOSSARY OF TERMS

ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AA	Active Army
AAH	advanced attack helicopter
abn	airborne
AC	Active Component
ACCB	air cavalry combat brigade (also CBAC)
ACE	Allied Command, Europe
ACMIP	Automated Force and Materiel Cost Methodology Improvement Project
ACR	armored cavalry regiment
ACS	armored cavalry squadron
ACSI	Assistant Chief of Staff for Intelligence
ACT	armored cavalry troop
AD	air defense
ADA	air defense artillery
AESRS	Army Equipment Status Reporting System
AFCENT	Allied Forces, Central Europe
AFNORTH	Allied Forces, Northern Europe
AFPCH	Army Force Planning Cost Handbook
AFPDA	Army Force Planning Data and Assumptions Study
AFPP	artillery firepower potential
AFSOUTH	Allied Forces, Southern Europe
AG	Adjutant General

AH	attack helicopter
AHC	attack helicopter company
ALO	authorized level of organization
ambl	airmobile
ammo	ammunition
APC	armored personnel carrier
armd	armored
arty	artillery
aslt	assault
ASM	Acquisition Strategy Model
ATGM	antitank guided missile
ATLAS	A Tactical, Logistics, and Air Simulation (Model)
atk	attack
ATM	antitank/mortar
AVIM	aviation intermediate maintenance
avn	aviation
AVUM	aviation unit maintenance
BAD	Blue attack a Red delay
BAHD	Blue attack a Red hasty defense
BAPD	Blue attack a Red prepared defense
BC	base case
bde	brigade
BE	Belgium
BENELUX	Belgium, Netherlands, Luxembourg

BMP	Russian armored personnel carrier
BMP-F/O	Russian armored personnel carrier follow-on
bn	battalion
BUSHMASTER	vehicle-mounted, rapid-fire weapons system
CA	Canada
CAA	US Army Concepts Analysis Agency combined arms army
CAACDB	CAA cost data bank
CAB	corps aviation brigade
CARMONETTE	a Monte Carlo, critical event sequenced, fully computerized simulation of ground combat
CAS	close air support
CAT	category
cav	cavalry
C/B	counterbreakthrough
CBAC	combat brigade, air cavalry (see ACCB)
CBSX	Continuous Balance System Expanded
cbt	combat
C-day	Contingency day (beginning of hostilities in a contingency operation)
CDB	Cost Data Bank
CEM	Concepts Evaluation Model; a low resolution, computerized, theater-level combat model
CENTAG	Central Army Group, Central Europe
CEPS	Central European Pipeline System
CEV	combat engineer vehicle

CEWI	combat electronic warfare intelligence
CFV	cavalry fighting vehicle
CG	Consolidated Guidance
CHAPARRAL	short-range air defense guided missile system
CLGP	cannon-launched guided projectile, 155mm (COPPERHEAD)
CMIA	captured/missing in action
co	company
CMD comd	command
COMMZ	communications zone
COMPO	composition
CONAF	Conceptual Design for the Army in the Field; a series of theater-level force design and evaluation studies, conducted at CDC and CAA
CONUS	Continental United States
COSFAM	TOE Cost Factors Model; accesses unit data system data bank and develops cost factors by type TOE unit
CRAF	Civil Reserve Air Fleet
CS	combat support
CSS	combat service support
DA	Department of the Army
DAMPL	Department of the Army Master Priority List
DARCOM	Department of the Army Materiel Development and Readiness Command
DASC	Department of the Army System Coordinator
DC	dry cargo

D-day	day on which hostilities commence
def	defense
DFE	division force equivalents
DIA	Defense Intelligence Agency
DIVAD	division air defense
DIVADA	division air defense artillery
DIVARTY	division artillery
DIV HQ	division headquarters
DIV MMC	division materiel maintenance center
DM	decisionmaker
DNBI	disease and nonbattle injuries
DRAGON	shoulder-fired, one-man antitank missile
ea	each
EAD	echelons-above-division
ech	echelon
EDATE	effective date
EEA	estimated expenditure of ammunition essential elements of analysis
EPA	Extended Planning Annex
FA	field artillery
FAS	force accounting system
FASTALS	Force Analysis Simulation of Theater Administrative and Logistics Support
FCIS	Force Cost Information System
FDM	Force Design Model

FEBA	forward edge of the battle area
FLOT	forward line of troops
FMPS	Functional Mathematical Programing System
FORD	Force Definition System
FPP	firepower potential
FRG	Federal Republic of Germany
FY	fiscal year
FYDP	Five Year Defense Program
GE	Germany
gp	group
GP	goal programing
grd	ground
GS	general support
GSFG	Group of Soviet Forces in Germany
HAWK	medium-range air defense guided missile system
hel helo	helicopter
hel-A	helicopter attack
hel-U	helicopter utility
hel-S	helicopter scout
HELLFIRE	helicopter-mounted, laser-guided antitank missile
HFPP	hard (antitank) firepower potential
HHB	headquarters and headquarters battery
HHC	headquarters and headquarters company

HQ	headquarters
HQDA	Headquarters, Department of the Army
hv	heavy
HNS	host nation support
HOW	howitzer
HOW-GN	howitzer-gun
ICM	improved conventional munitions
ID	Iran D-day
IDOFOR	Improving the Definition of the Army Objective Force Study
IFV/CFV	infantry fighting vehicle/cavalry fighting vehicle
in	inch
inf	infantry
IOC	initial operational capability
IRR	Individual Ready Reserve
ITAC	Intelligence Threat Analysis Center
ITV	improved TOW vehicle
JCS	Joint Chiefs of Staff
JLRSA	Joint Long Range Strategic Appraisal
JSPD	Joint Strategic Planning Document
JSPDSA	Joint Strategic Planning Document Supporting Analysis
JSPS	Joint Strategic Planning System
KIA	killed in action
km	kilometer(s)

kph	kilometer(s) per hour
LANCE	long-range, surface-to-surface, field artillery missile system with nuclear and/or conventional capability
LAATV	lightly armored antitank vehicle
LATTV	light antitank tracked vehicle
LATV	lightly armored tracked vehicle
LGP	linear goal programing
LIN	line item number
LOC	lines of communication
LP	linear programing
LWCM	lightweight company mortar
MAB	Marine Amphibious Brigade
MAF	Marine Amphibious Force
maint	maintenance
M-day	mobilization day
ME	meeting engagement
mech	mechanized
med	medical
MFPP	medium (antilight armor) firepower potential
mhr/day	manhours per day
MLRS	multiple launcher rocket system, formerly the general support rocket system (GSRS)
mm	millimeter(s)
MNBN	maneuver battalion(s)

MODEXIT	a computer model which calculates the modernized or activated unit cost and updates the CAA Cost Data Bank
MODHI	modernization hierarchy
MOE	measure of effectiveness
MOS	military occupational specialty
MP	military police
MPA	Military Personnel, Army
MPS	Maritime Prepositioned Ship
MRD	Warsaw Pact motorized rifle division
MRL	multiple rocket launcher
MRLOGAEUR	minimum requirements logistic augmentation, Europe
MRR	motorized rifle regiment
ms	minisector(s)
mtz	motorized
mvr	maneuver
NA	notional armored unit
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NI	notional infantry unit
NM	notional mechanized unit
NL	Netherlands
NORCEN	North Central Army Group
NORIG	undefined NATO Army
NORTHAG	Northern Army Group

NRC	nonrecurring costs
NSN	national stock number
OACSI	Office of the Assistant Chief of Staff for Intelligence
obj	objective
OCA	Office, Comptroller of the Army
ODCSOPS	Office, Deputy Chief of Staff for Operations and Plans
OEL	organization and equipment list
OH	observation helicopter
OMA	operation and maintenance, Army
OMAR	operation and maintenance, Army Reserve
OMARNG	operation and maintenance, Army National Guard
OMNIBUS	a HQDA sponsored study of force capabilities in Europe during the near timeframe, conducted currently by CAA
OPF	objective planning force
ORF	operation readiness float
OSD	Office of the Secretary of Defense
PADS	Position Azimuth Determinating System
PATRIOT	developmental long-range air defense missile system
PLRS	Position Locating and Reporting System
POL	petroleum, oils, and lubricants
POM	Program Objective Memorandum
POMCUS	prepositioning of materiel configured to unit sets
PPBS	Planning, Programing and Budget System

PWRMS	prepositioned war reserve materiel stocks
RAM	realiability, availability, maintainability
RAD	Red attack a Blue delay
RAHD	Red attack a Blue hasty defense
RAPD	Red attack a Blue prepared defense
R/B	Red/Blue
RC	Reserve Component recurring cost
R_c	rate compatibility
RCF	repair cycle float
regt	regiment
ROLAND	division/corps replacement for CHAPARRAL; surface-to-air missile system
RPA	Reserve Personnel, Army
RPG	hand-held antitank grenade
RPV	remotely piloted vehicle
RTD	return to duty
sct/inf	scout/infantry
sep	separate
SFPP	soft (antipersonnel) firepower potential
SIMSRC	Similar SRC Automated Cost Model
SLGP	sequential linear goal programing
SLUFAE	surface-launched unit fuel air explosive
SLUMINE	surface-launched unit mine
SP	self-propelled

spt	support
sqd	squad
sqdn	squadron
SRC	standard requirement code
SRC Cost	Automated cost model that costs FASTAL's output file
S&T	supply and transportation
std	standard
STINGER	manportable air defense weapon
STON	short tons
SWA	Southwest Asia
system slice	the part of a force directly or indirectly associated with a particular grouping of weapons including all combat and support personnel and equipment and costs which enable that and only that grouping to function in combat
T	towed
TAA	Total Army Analysis Study; a HQDA approved evaluation of the support structure requirements for the programed combat force, conducted currently at CAA
TACFIRE	tactical fire direction system
TC	theater cycle
TD	Warsaw Pact tank division
TDA	table(s) of distribution and allowances
tgt	target
THTR HQ	theater headquarters
TIWSS	Tactical Integrated Warfare Scenario Study
TOE	table(s) of organization and equipment

TOW	tube-launched, optically tracked, wire-guided missile
TP	time period
TPSN	troop program sequence number
TRADOC	US Army Training and Doctrine Command
TRANSFORM	*Trade-off Analysis Systems/Force Mix Study*
TRANSMO	Transportation Model
TRASANA	US Army Training and Doctrine Command Systems Analysis Agency
UDS	Unit Data System
UE	unit equipment
UIC	unit identification code
US	United States
USAMSSA	US Army Management Systems Support Agency
USAREUR	United States Army, Europe
USMC	United States Marine Corps
VERT	Venture Evaluation Review Technique
VULCAN	short-range, 20mm air defense system, T or SP
WARF	wartime replacement factors
WEI/WUV	weapons effectiveness indices/weighted unit values
WIA	wounded in action
WP	Warsaw Pact
wpn	weapon
WT	warning time
ZDL	Zagros Defense Line


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8